

Studying solutions of Quadratic Equations

The Discriminant (pg. 521): The radicand $b^2 - 4ac$ is known as the discriminant. If a , b , and c are rational, then

the following describes the types of solutions a quadratic equation could have.

The discriminant is $b^2 - 4ac$ of $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

If $b^2 - 4ac < 0$, then the root (solution) is a complex number

If $b^2 - 4ac > 0$, then there are two real roots (solutions)

If $b^2 - 4ac = 0$, then there is one real root (solution)

If $b^2 - 4ac < 0$, then there are two complex conjugate roots

Graphs of $f(x) = ax^2 + bx + c$ or $y = ax^2 + bx + c$

$b^2 - 4ac > 0$
two x-intercepts

$b^2 - 4ac = 0$
one x-intercept

$b^2 - 4ac < 0$
no x-intercepts

Examples (pg. 522 – 523):

For each equation, determine what type of number the solutions are and how many solutions exist.

$$9x^2 - 12x + 4 = 0$$

$$x^2 + 5x + 8 = 0$$

$$2x^2 + 7x - 3 = 0$$

Find an equation for which the given numbers are solutions

3 and $-\frac{2}{5}$

$2i$ and $-2i$

$5\sqrt{7}$ and $-5\sqrt{7}$

$-4, 0$, and 1